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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SUN, XIUQIN

ART UNIT	PAPER NUMBER
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2863

DATE MAILED: 04/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/717,086

Applicant(s)

ZHAN ET AL.

Examiner

Xiuqin Sun

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19 and 22-24 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 8, 11, 14, 17, 20 and 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 7, 9-10, 13, 15-16, 19 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eryurek et al. (U.S. Pub. No. 20040024568) in view of Ridolfo (U.S. Pub. No. 20030216888).

In regard to claim 1:

Eryurek et al. teach a method, comprising: identifying one or more operating characteristics associated with a valve (sections 0017-0020); identifying one or more indicators of a possible defect in the valve at a plurality of resolution levels using at least one of the one or more operating characteristics (sections 0020, 0022, 0023, 0025, 0027, 0028 and 0039); generating a plurality of indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect (sections 0027-0029); selecting one of the plurality of resolution levels using at least one of the indexes (sections 0029 and 0031-0033); and determining an overall operation condition of a valve using at least one index associated with the selected resolution level (sections 0020, 0028, 0029 and 0029).

Eryurek et al. do not mention explicitly: determining an overall probability of a valve defect.

Ridolfo teaches a predictive maintenance display system, including: determining an overall probability of a valve failure using selected resolution level of sensed operating characteristics associated with the valve (sections 0045, 0050-0052, 0063-0065 and 0081-0092).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Ridolfo in the invention of Eryurek et al. in order to provide a means for determining the probability of a valve failure under a specified condition and allow the plant staff to fully explore the probability continuum (Ridolfo, Abstract and section 0082).

In regard to claims 2, 3 and 7:

The teaching of Eryurek et al. further includes: the one or more operating characteristics comprise at least one of measurements of a process variable associated with operation the valve and values generated to control the operation of the valve (sections 0017, 0021 and 0031-0034); and the one or more indicators comprise at least one of jumps in the process variable measurements and extreme positions in the generated control values (sections 0028 and 0039); said process variable measurements comprise measurements of a flow rate of one or more materials flowing through the valve (section 0031); the generated control values comprise values used to adjust an opening of the valve and thereby adjust the flow rate (Fig. 1 and sections 0017, 0018 and 0031); and selecting one of the resolution levels comprises selecting

the resolution level having the indexes resulting in a highest likelihood of a valve defect (sections 0029-0033).

In regard to claim 9:

Eryurek et al. teach an apparatus, comprising: a memory operable store one or more operating characteristics associated with a valve (Fig. 2 and sections 0017-0020); and one or more processors (Fig. 2) collectively operable to: identify one or more indicators of a possible defect in the valve at a plurality of resolution levels using at least one of the operating characteristics (sections 0020, 0022, 0023, 0025, 0027, 0028 and 0039); generate a plurality of indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect (sections 0027-0029); select one of the plurality of resolution levels using at least one of the indexes (sections 0020, 0028, 0029 and 0029).

Eryurek et al. do not mention explicitly: determine an overall probability of a valve defect using at least one index associated with the selected resolution level.

Ridolfo teaches a predictive maintenance display system, including: determining an overall probability of a valve failure using selected resolution level of sensed operating characteristics associated with the valve (sections 0045, 0050-0052, 0063-0065 and 0081-0092).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Ridolfo in the invention of Eryurek et al. in order to provide a means for determining the probability of a valve failure under a

specified condition and allow the plant staff to fully explore the probability continuum (Ridolfo, Abstract and section 0082).

In regard to claims 10 and 13:

The teaching of Eryurek et al. further includes: the one or more operating characteristics comprise at least one of measurements of a process variable associated with operation the valve and values generated to control the operation of the valve (sections 0017, 0021 and 0031-0034); and the one or more indicators comprise at least one of jumps in the process variable measurements and extreme positions in the generated control values (sections 0028 and 0039); and selecting one of the resolution levels comprises selecting the resolution level having the indexes resulting in a highest likelihood of a valve defect (sections 0029-0033).

In regard to claim 15:

Eryurek et al. teach a computer program embodied on computer readable medium and operable to be executed by a processor (Fig. 2, sections 0018 and 0040), the computer program comprising computer readable program code for: identifying one or more indicators of a possible defect in a valve at a plurality of resolution levels using at least one of one or more operating characteristics associated with the valve (sections 0017-0020, 0022, 0023, 0025, 0027, 0028 and 0039); generating a plurality indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect (sections 0027-0029); selecting one of the plurality of resolution levels using at least one of the indexes (sections 0029-0031).

Eryurek et al. do not mention explicitly: determine an overall probability of a valve defect using at least one index associated with the selected resolution level.

Ridolfo teaches a predictive maintenance display system, including: determining an overall probability of a valve failure using selected resolution level of sensed operating characteristics associated with the valve (sections 0045, 0050-0052, 0063-0065 and 0081-0092).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Ridolfo in the invention of Eryurek et al. in order to provide a means for determining the probability of a valve failure under a specified condition and allow the plant staff to fully explore the probability continuum (Ridolfo, Abstract and section 0082).

In regard to claims 16 and 19:

The teaching of Eryurek et al. further includes: the one or more operating characteristics comprise at least one of measurements of a process variable associated with operation the valve and values generated to control the operation of the valve (sections 0017, 0021 and 0031-0034); and the one or more indicators comprise at least one of jumps in the process variable measurements and extreme positions in the generated control values (sections 0028 and 0039); and selecting one of the resolution levels comprises selecting the resolution level having the indexes resulting in a highest likelihood of a valve defect (sections 0029-0033).

In regard to claim 22:

Eryurek et al. teach a system, comprising: a valve (Fig. 1); a measuring device operable to generate measurements of a process variable associated with operation of the valve (sections 0017-0020); a controller operable to generate output values for adjusting the valve based on the process variable measurements (Figs. 1 and 2; sections 0017, 0018 and 0031); and a defect detector operable identify one or more indicators of a possible defect in the valve at a plurality of resolution levels using at least one of the process variable measurements and the output values (sections 0020, 0022, 0023, 0025, 0027, 0028 and 0039); generate a plurality of indexes associated with the resolution levels, the indexes based on the one or more indicators and each identifying a likelihood of a valve defect (sections 0027-0029); select one of the plurality of resolution levels using at least one of the indexes (sections 0029 and 0031-0033); and determining an overall operation condition of a valve using at least one index associated with the selected resolution level (sections 0020, 0028, 0029 and 0029).

Eryurek et al. do not mention explicitly: determine an overall probability of a valve defect using at least one index associated with the selected resolution level.

Ridolfo teaches a predictive maintenance display system, including: determining an overall probability of a valve failure using selected resolution level of sensed operating characteristics associated with the valve (sections 0045, 0050-0052, 0063-0065 and 0081-0092).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Ridolfo in the invention of Eryurek et al. in order to provide a means for determining the probability of a valve failure under a

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specified condition and allow the plant staff to fully explore the probability continuum (Ridolfo, Abstract and section 0082).

In regard to claim 23:

Eryurek et al. further teach: said defect detector forms part of the controller (Fig.2 and sections 0017-0019).

3. Claims 6, 12, 18 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Eryurek et al. (U.S. Pub. No. 20040024568) in view of Ridolfo (U.S. Pub. No. 20030216888), as applied to claims 1, 9 and 15 above, and further in view of Abdel-Malek et al. (U.S. Pat. No. 5646600).

Eryurek et al. teaches a method and apparatus that includes the subject matter discussed above. Eryurek et al. do not mention explicitly: apply said method to detecting stick-slip type of valve defect.

Abdel-Malek et al. teach an instrument for detecting potential future failures of valves, including: using the one or more indicators to identify one or more stiction events at different resolution levels, each stiction event comprising a stick phase and a slip phase (col. 1, lines 40-65 and col. 3, lines 41-65).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teaching of Abdel-Malek et al. with the invention of Eryurek et al. in order to provide a method for detecting stick-slip in the operation of a valve and using the output to predict possible defect of the valve (Abdel-Malek et al., col. 1, lines 40-65).

Allowable Subject Matter

4. Claims 4, 5, 8, 11, 14, 17, 20 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Reasons for Allowance

5. The following is an examiner's statement of reasons for allowance:

The primary reason for the allowance of claims 4 and 5 is the inclusion of the claimed method steps of: grouping the wavelet coefficients at different resolution levels into groups; and identifying the jumps in the process variable measurements at the plurality of resolution levels using the groups of wavelet coefficients. It is these limitations found in each of the claims, as they are claimed in the combination that have not been found, taught or suggested by the prior art of record, which make these claims allowable over the prior art.

The primary reason for the allowance of claims 8, 14, and 20 is the inclusion of the following limitations: generating the plurality of indexes comprises identifying multiple sets of one or more stiction events using different operating characteristics and generating multiple sets of indexes using the sets of stiction events; and determining the overall probability of a valve defect comprises determining a plurality of probabilities associated with the sets of indexes and using the plurality of probabilities to determine the overall probability. It is these limitations found in each of the claims, as they are

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claimed in the combination that have not been found, taught or suggested by the prior art of record, which make these claims allowable over the prior art.

The primary reason for the allowance of claims 11 and 17 is the inclusion of the following limitations: grouping the wavelet coefficients at different resolution levels into groups; identifying the jumps in the process variable measurements at the plurality of resolution levels using the groups of wavelet coefficients; and identifying the extreme positions the generated control values using number of jumps the process variable measurements at each of the resolution levels. It is these limitations found in each of the claims, as they are claimed in the combination that have not been found, taught or suggested by the prior art of record, which make these claims allowable over the prior art.

The primary reason for the allowance of claim 21 is the inclusion of the following limitation: comprising computer readable program code for classifying the overall probability into one of a plurality of classifications. It is this limitation found in the claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

6. Applicant's arguments received 2/25/2005 with respect to claims 1-3, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19 and 22-24 have been considered but they are not persuasive.

In response to applicant's arguments, the Examiner carefully reviews the Eryurek reference again and deems that the cited prior art does teach the limitations argued by the Applicants. Detailed response is given in section 2 as set forth above in this Office Action.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, it is deemed that the combined teachings of the Eryurek patent and the Ridolfo patent would have suggested to those of ordinary skill in the art a method for identifying defective valves including a step of determining an overall probability of a valve defect, as delineated in section 2 set forth above in this Office Action.

Claims 6, 12, 18 and 24 are further rejected as new prior art reference (U.S. Pat. No. 5646600 to Abdel-Malek et al.) has been found to teach the limitation of detecting stick-slip type valve defect. Detailed response is given in section 3 as set forth above in this Office Action.

Contact Information

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuqin Sun whose telephone number is (571)272-2280. The examiner can normally be reached on 6:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571)272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Xiuqin Sun
Examiner
Art Unit 2863

XS
April 6, 2005



MICHAEL NGHIEM
PRIMARY EXAMINER